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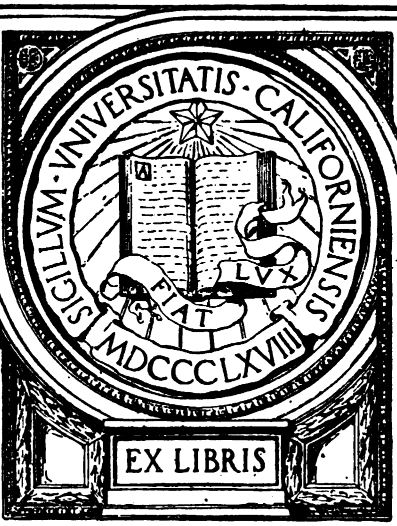

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DESCRIPTION OF
3-INCH
TELESCOPIC SIGHTS
MODEL OF 1912

(THREE PLATES)

MARCH 20, 1914

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WAR DEPARTMENT,
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By order of the Secretary of War:

WILLIAM CROZIER,
Brigadier General, Chief of Ordnance.

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3-INCH TELESCOPIC SIGHT, MODEL OF 1912.

(Three plates.)

1. The advantages gained by the use of a telescope in laying a piece consists of a decrease in personal error and an increase in power of vision. A telescopic sight enables a gunner to see clearly an object which is indistinct to the naked eye and to lay a gun on it with facility and accuracy.

2. For the designation of parts see Plates I, II, and III, and the list attached hereto giving the nomenclature. Plate I shows a sectional view of the telescope. Plate II shows the assembled sight mounted on a sight bracket (93) for 6-inch barbette carriage. Plate III shows sight brackets (94), (95), for 6-inch disappearing carriage and 14-inch disappearing carriage.

3. The principal parts are the telescope (1), (2), (12), (28), (51), telescope clamps (96), (97), cradle (90), cradle yoke (92), fulcrum pin (101), elevating screw (105), deflection scale (86), micrometer head (81), deflection worm (84), sight brackets (93), (94), (95), hinge pin (107), lamp cable (89), and electric lamps.

4. The telescope (1), (2), (12), (28), (51), is secured in position on four accurately machined projections on the cradle (90), by the front and rear telescope clamps (96), (97), each of which is machine finished to proper bearings on the upper portion of the telescope (1), (2), (12), (28), (51), to secure proper alignment of the optical axis and to insure verticality of the vertical wire.

5. The cradle (90) is hinged at its forward end to the cradle yoke (92), by means of the hinge pin (107), which permits rotation for elevation and depression, and the rear end rests on the elevating screw (105). The elevating screw (105) is used to adjust the telescope (1), (2), (12), (28), (51), in elevation and depression. The cradle spring (75), used in conjunction with the spring bolt (74), holds the cradle (90) firmly on the elevation screw (105). On each side of the cradle (90) is a lug, machine finished on their ends so as to slide between the guides on the cradle yoke (92) and take up lost motion in the hinge pin (107).

6. The cradle yoke (92) is seated at the forward end on the sight brackets (93), (94), (95), and secured in place by the fulcrum pin (101), which allows for rotation in azimuth only, and the rear end is assembled to the sight brackets (93), (94), (95), by the elevating screw bushing (103), which forms a guide.

7. The sight bracket (93), (94), or (95) is bolted to the carriage. The open sight consists of two V slots in projections to the prism cover about 3½ inches apart. It is for use in picking up an object quickly.

8. The deflection mechanism consists principally of the deflection worm (84), deflection scale (86), micrometer head (81), deflection-worm knob (87), adjusting sleeve (82), swivel nut (76), swivel pin (102), deflection-worm cover (85), and swivel-pin clamping screw (79).

9. Deflection is obtained by rotating the deflection worm (84), which is seated in the swivel pin (102) and engages a worm thread in the swivel nut (76).

10. The swivel nut (76) is pivoted in the rear end of the cradle yoke (92). The swivel pin (102) is pivoted in the rear end of the sight bracket (93), (94), (95). Both are permitted to rotate in azimuth.

11. The micrometer head (81) is keyed to the left end of the deflection worm (84) and is numbered counterclockwise and graduated for each five one-hundredths of a degree. It has a straight knurled surface by which it can be rotated, although the deflection worm knob (87) is provided for this purpose.

12. The deflection scale (86) of German silver is secured to the swivel nut (76) and is graduated in degrees. The numbers at each graduation are reference numbers and read from 1 to 5, "3" representing the origin or central position of the deflection scale (86). A line is graduated across the ends and perpendicular to the numbered graduations the full length of the deflection scale (86), which is used as an index for the graduations on the micrometer head (81). On the rear end of the cradle (90) is a lamp bracket. Through an opening in this bracket the rays from a small electric lamp illuminate the deflection scale (86).

13. The adjusting sleeve (82) is used to accurately locate the swivel pin (102) with the swivel nut (76) when the zero graduation on the micrometer head (81) is set to the index graduation on the deflection scale (86). A saw slot through one side of the swivel pin (102) permits the clamping of the adjusting sleeve (82) by the swivel-pin clamping screw (79).

14. The deflection worm cover (85) is attached to the swivel pin (102) and is used to protect the deflection worm (84).

15. The principal parts of the telescope (1), (2), (12), (28), (51) are the telescope tube (1), objective (33), objective shutter (2), (3), prisms (36), (37), cross wires (25), lamp bracket (19), draw tube (14), focusing nut (27), focusing-nut cap (28), and the eyepiece.

16. The telescope tube (1) is the principal piece to which the other parts are assembled. The objective (33) is a doublet, seated in the

objective cell (5), which screws into the forward end of the telescope tube (1). The prisms (36), (37) are two in number and are retained in the prism holder (9) by the prism-retaining springs (10).

17. The front end of the telescope (1), (2), (12), (28), (51), is provided with the objective shutter (2), (3), for the protection of the objective (33).

18. The clear aperture of the telescope (1), (2), (12), (28), (51), is 3 inches, the focal length of the objective (33) is 24 inches, the magnifying power 15 diameters, and the field 3° 20′.

19. The image is erect, the erection being secured by the prisms (36), (37), each of which twice totally reflects the pencil of light at an angle of 90° so that it emerges parallel to the entering pencil and in the original direction. The prisms (36), (37), are not interchangeable, and in each is a slot for a pin driven in the prism seat of the prism holder (9). The prism holder (9) is attached to the telescope tube (1) by dowels and screws. The prism cover (12) is closely fitted to the telescope tube (1), forming a dust and moisture tight joint, and is retained in position by the prism-cover screws (66).

20. The amber-glass disk (39), assembled in the amber-glass holder (13), is provided to protect the eye from a glare of light. It is riveted to the glass-holder stud (21), which is seated in the rear wall of the telescope tube (1) below the eyepiece. The glass-holder handle (23) is pinned to the glass-holder stud (21) and is used to throw the amber-glass disk (39) in use or not, as desired. The spring washer (22) keeps the glass-holder stud (21) firmly in its seat.

21. The cross wires (25) are of platinum wire 0.001 of an inch in diameter. They are secured to the cross wire frame (40) by four cross wire clips (45), and are at right angles to each other. The cross wire frame (40) is set on dowel pins in the cross wire frame holder (24) and secured by the cross wire frame clamp screws (108), and may be removed by the cross wire frame extractor (72) after removing the eyepiece and turning the cross wire frame clamp screws (108) 180 degrees.

22. Seated in a slot around the front end of the draw tube (14) are the cross wire frame holder clips (45), which cover the elongated holes through which the cross wire frame holder screws (34) extend. These screw holes are elongated to permit adjustment of the cross wires (25).

23. The draw tube (14) is assembled to the telescope tube (1) by the draw tube key (11) so as to allow longitudinal motion only of the former when the focusing nut (27) and the focusing nut cap (28) are rotated.

24. The focusing nut (27) is seated on the rear end of the telescope tube (1) by a threaded surface and the focusing nut cap (28) is seated on the focusing nut (27) in the same manner and locked by a screw

after assembling. A projection on the draw tube (14) is held between the above nuts and rotation of these nuts transmits longitudinal motion to the draw tube (14). The longitudinal motion is limited by the draw tube key (11).

25. The cross wires (25) are illuminated by a small electric lamp placed in the lamp bracket (19) which is secured to the rear end of the telescope tube (1). Two lamp bracket reflectors (46), in the lamp bracket (19), deflect the rays of light through the openings cut through the telescope tube (1) and draw tube (14) 90 degrees apart. These openings are so arranged that the light from each reflector is thrown upon the full length of the wire opposite. The intensity of illumination of the cross wires (25) may be varied by turning the lamp bracket diaphragm (18) which has two V-shaped openings which pass over slots in the lamp bracket (19), thereby varying the area of the light openings.

26. The openings in the lamp bracket (19) are sealed by the lamp bracket windows (47) and those in the draw tube (14) by the draw tube window (49).

27. The eyepiece consists principally of the eyepiece tube (16), field lens (35), eye lens (38), hood retaining ring (52), and rubber hood (51). The eyepiece serves to magnify the image at the cross wires (25) and to converge the rays of light into a pencil of a size suited to enter the pupil of the eye. The eyepiece tube (16) is screwed into the draw tube (14) and carries the field lens (35) and the eye lens (38) with their respective cells.

28. There is assembled to the eyepiece tube (16) the focusing index ring (15) with a scale graduated in diopters on its perimeter to register with a graduated line on the draw tube (14). The eyepiece stop ring (17) is made to allow for a total longitudinal movement of the eyepiece of ± 2 diopters from "0" or normal position.

29. The hood retaining ring (52) with its straight knurled surface serves to focus the eyepiece and also to retain the rubber hood (51) in its seat.

30. The rubber hood (51) is so shaped as to keep light out of the eye from the sides and rear and reduce the shock to the eye when firing. It is seated between the hood support (53) and the clamp ring (50) and can be turned to any position to suit the eye and is held by the hood friction spring (54).

31. Each sight is provided with two small electric lamps of about 2 candlepower, and of the following voltages: 110-volt when used on disappearing carriages mounted in emplacements with 110 or 220 volt mains; 74-volt when used on other than disappearing carriages and with 220-volt mains; and 36-volt when used with 5-inch and 6-inch barbette carriages with 110-volt mains. One of these lamps illuminates the cross wires (25) giving bright lines in a dark field, and the

other illuminates the deflection scale (86). They are connected with the electric circuit by the cables (89) and plug connections.

METHOD OF ASSEMBLING THE SIGHTS.

32. In assembling the bracket (93), (94), or (95) to the carriage great care should be taken to see that the seats are level in both directions, and that burs, paint, and rust are removed from them and the feet of the bracket (93), (94), or (95). A small obstruction of this kind will throw the sight out of plumb. In setting up the bolts, all should be brought to a firm bearing before any are set up tight.

33. The position of the zero graduation on the micrometer head (81) may be determined by adjusting the telescopic sight so that its axis intersects the axis of the gun at mid range.

ADJUSTMENT.

34. The cross wires (25) are rendered distinct by screwing the eyepiece in or out; this adjustment has no other object. If the telescope is frequently used by the same observer, the eyepiece can be reset at the correct position by the use of the diopter scale. After bringing the cross wires (25) into distinct vision by adjusting the eyepiece, the wires may be brought into the focal plane by turning the focusing-nut cap (28) until the object appears distinct and does not seem to shift when the eye is moved from side to side of the eyepiece. This adjustment is impossible if the object is too close to the telescope.

35. The cross wire frame holder screws (34) may be reached by first releasing the lamp bracket clamping screw (68), removing the lamp bracket screws (69), and turning the lamp bracket (19) until the cross wire frame holder screws (34) are visible through the openings in the telescope tube (1). When adjusting the cross wires (25) the collimating telescope furnished with the optical repair kit should be placed in the rings and securely clamped in the cradle (90) and when properly adjusted should be sighted on a target having plumb and horizontal lines. The telescope is now placed in the cradle (90), with its axis coinciding with the axis of the collimating telescope. The cross wires (25) should be adjusted to coincide with the same plumb and horizontal lines which were seen through the collimating telescope.

CARE AND PRESERVATION.

36. Telescopic sights are necessarily delicate instruments and must not be subjected to rough usage. When not in use the telescope should be kept in its leather case and should be stored in a dry place. It should be occasionally examined to insure its not being corroded by tannic acid from the case, and all traces of dust or moisture should be removed before putting it away. To obtain satisfactory vision

the glasses should be kept perfectly clean and dry. In case moisture collects on the glasses, place the telescope in a gentle warmth. This is usually sufficient to remove it.

37. Material issued for cleaning of lenses only should be used, care being taken that the cleaning material does not contain any dirt or grit. The glasses will seldom require cleaning on the inside. All the joints are sealed when the telescopes leave the manufacturer, and any disassembling will break the seals, thus permitting dust and moisture to enter. Cleaning of the interior should only be done by a competent person. It will be advisable to send the telescope to an arsenal for cleaning of the interior.

38. The prisms (36) (37) should not be removed from the prism holder (9) except by a person with special training in the care of telescopes; and if they need repair, report should be made to proper authority. Removal will break the seal and is apt to disturb the adjustment. Finger marks or lint will cause difficulty.

39. The cross wires (25) are unprotected when the eyepiece is removed, and great care must be exercised not to touch them, as they are very delicate. No attempt should be made to clean them, except by blowing on them.

40. The sight bracket (93), (94), or (95) and cradle (90) should never be removed from the carriage unless the carriage is to be dismounted. When not in use these parts should be kept protected by the covers provided for the purpose. All bearing surfaces should be kept thoroughly oiled, expecial care being given to the deflection worm (84) and bearings for the telescope which are of steel. Care should be taken not to remove the oil in putting on the covers. The oil should be wiped off before use. The cover should be removed and the sight bracket examined at least once in every two weeks, and the cradle should be moved in elevation and deflection.

41. No oil should be allowed on the surfaces of the lenses and prisms.

42. Special care should be taken in the use of the small electric lamps, as they are fragile. Each lamp should seat in its receptacle not less than one and one-half turns.

DISMANTLING AND ASSEMBLING.

43. General instructions for disassembling and cleaning are given in pamphlet No. 1795, Instructions for the Care, Preservation, Repair, and Adjustment of Instruments for the Fire Control Systems for Coast and Field Artillery, paragraphs 24 to 28, and 35 to 38, inclusive.

44. If a sight is packed for shipment, special attention should be given to the blocking of it in its packing box to prevent all movement of the sight during transit. The telescope should be packed separately.

45. When ordering spare parts use the nomenclature and piece marks below.

Nomenclature of sights. (Plates, I, II, and III.)

Illustration No.	Piece mark.	Name of part.
1	S7A2	Telescope tube.
2	S7B1	Objective shutter.
3	S7C	Objective shutter felt piece.
4	S10JA	Eyepiece stop ring screw.
5	S7E	Objective cell.
6	S7F	Objective retaining ring.
7	S7G	Shutter spring.
8	S7H	Shutter shaft.
9	S8O	Prism holder.
10	S8D	Prism retaining spring.
11	S8E	Draw tube key.
12	S8F	Prism cover.
13	S8G	Amber glass holder.
14	S8H1	Draw tube.
15	S8J	Focusing index ring.
16	S8K1	Eyepiece tube.
17	S8M	Eyepiece stop ring.
18	S8L	Lamp bracket diaphragm.
19	S9A2	Lamp bracket.
20	S9B	Lamp bracket filler.
21	S9C	Glass holder stud.
22	S9P	Spring washer.
23	S9H	Glass holder handle.
24	S9E1	Cross wire frame holder.
25	S9K	Cross wire.
26	S9G	Cross wire frame holder clip.
27	S9L	Focusing nut.
28	S9M	Focusing nut cap.
29	S9N	Field lens cell.
30	S9P	Field lens ring.
31	S9Q	Eye lens ring.
32	S9R	Eye lens cell.
33	S10B	Objective.
34	S10KA	Cross wire frame holder screw.
35	S10P	Field lens.
36	S10C	Prism.
37	S10D	Prism.
38	S10E	Eye lens.
39	S10G	Amber glass disk.
40	S10KA	Cross wire frame.
41	EA12D	Finger grip.
42	EA12E	Lamp bracket cap.
43	EA12C	Lamp bracket bushing.
44	EA12F	Chain.
45	EA12H	Cross wire clip.
46	EA12N	Lamp bracket reflector.
47	EA12L	Lamp bracket window.
48	EA12M	Window retaining ring.
49	EA13B	Draw tube window.
50	EA14X	Clamp ring.
51	EA14W	Rubber hood.
52	EA14Y	Hood retaining ring.
53	EA14AA	Hood support.
54	EA14Z	Hood friction spring.
55	S10H	Cross wire clip screw.
56	S10J	Eye lens cell retaining screw.
57	S10K	Eye lens ring retaining screw.

Nomenclature of sights. (Plates I, II, and III.)—Continued.

Illustration No.	Piece-mark.	Name of part.
58	S10J	Focusing index ring screw.
59	S10K	Draw tube key screw.
60	S10K	Field lens cell retaining screw.
61	S10K	Field lens ring retaining screw.
62	S10Q	Lamp bracket reflector screw.
63	S10R	Objective retaining ring screw.
64	S10S	Hood retaining ring screw.
65	S10T	Chain screw.
66	S10BA	Prism cover screw.
67	S10W	Objective cell retaining screw.
68	S10V	Lamp bracket clamp screw.
69	S10Z	Lamp bracket screw.
70	S10AA	Lamp bracket lock screw.
71	S10K	Focusing nut cap retaining screw.
72	S10LA	Cross wire frame extractor.
73	S5L	Spring bolt washer.
74	S5M	Spring bolt.
75	S5N	Cradle spring.
76	S5P	Swivel nut.
77	S10X	Deflection worm cover screw.
78	S10DA	Elevation bushing nut lock screw.
79	S10EA	Swivel pin clamping screw.
80	S10V	Deflection worm nut screw.
81	EA19A	Micrometer head.
82	EA19C	Adjusting sleeve.
83	EA19B	Deflection worm nut.
84	EA19D1	Deflection worm.
85	EA19E	Deflection worm cover.
86	EA19F	Deflection scale.
87	EA19G	Deflection worm knob.
88	EA19H	Deflection worm key.
89	....	Lamp cable.
90	S2B	Cradle.
91	S2A	Bronze bushing.
92	S2C	Cradle yoke.
93	S2D2	Sight bracket (for 6-in. Barbette Carriage).
94	S3A	Sight bracket (for 6-in. Disappearing Carriage).
95	S3B	Sight bracket (for 14-in. Disappearing Carriage).
96	S4A	Telescope clamp (front).
97	S4B	Telescope clamp (rear).
98	S4C	Clamp pin.
99	S4D	Clamp screw.
100	S4E	Clamping screw knob.
101	S4J	Fulcrum pin.
102	S4M	Swivel pin.
103	S5E	Elevating screw bushing.
104	S5F	Elevating screw bushing nut.
105	S5GI	Elevating screw.
106	S5HI	Elevating screw knob.
107	S5K	Hinge pin.
108	S10JA	Cross wire frame clamp screw.

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